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Diesel engines — Steel tubes for high-pressure fuel injection pipes —

Part 1: Requirements for seamless cold-drawn single-wall tubes

Moteurs diesels — Tubes en acier pour lignes d'injection de combustible à haute pression —

Partie 1: Exigences pour les tubes monoparoi sans soudure étirés à froid

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain, and powertrain fluids*.

This sixth edition cancels and replaces the fifth edition (ISO 8535-1:2011), which has been technically revised with the following changes:

— inside diameter sizes 3,5 mm and 3,6 mm have been added to Table 1;

— code 5 and code 6 have been added to Table 4.

A list of parts in the ISO 8535 series can be found on the ISO website.

NOTE The first part of the general title, "*Diesel engines*", is used for Part 1 only while for Part 2, "*Compression-ignition engines*" is still used but will be replaced at the next revision.

Diesel engines — Steel tubes for high-pressure fuel injection pipes —

Part 1: Requirements for seamless cold-drawn single-wall tubes

1 Scope

This document specifies dimensions and requirements for seamless cold-drawn single-wall steel tubes for high-pressure fuel injection pipes used on diesel (compression-ignition) engines (class 2) and for fuel injection pump testing (class 1).

This document applies to diesel (compression-ignition) engines.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 12345, *Diesel engines — Cleanliness assessment of fuel injection equipment*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

4 Dimensions and tolerances

4.1 Diameters

Recommended inside and outside diameters are given in Table 1. Other sizes may be used by agreement between supplier and customer.

Tolerances on inside and outside diameters shall be as follows.

a) Inside diameter, d

$d \leq 4$ mm: ±0,05 mm for class 2

±0,025 mm for class 1 (these tolerances are in accordance with ISO 4093)

$d > 4$ mm: ±0,10 mm

NOTE Classes 1 and 2 are explained in Clause 1.

b) Outside diameter, D

$D < 8$ mm: ±0,06 mm

$D \geq 8$ mm: ±0,10 mm

for classes 1 and 2

c) The maximum value of the concentricity of the tube outside diameter relative to the inside diameter shall be proportional to the wall thickness, as shown in Figure 1.

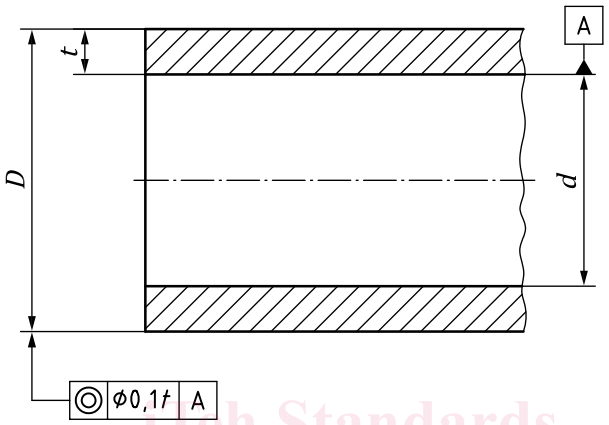

Figure 1 — Concentricity of the tube outside diameter

4.2 Length

Length and tolerances on length shall be by agreement between supplier and customer.

5 Material processing

5.1 Steel manufacturing process

The tubes shall be manufactured from unalloyed quality steel or an equivalent quality steel produced by a steel-making process that ensures a very homogeneous structure.

If requested by the customer, the supplier shall state the method of manufacture and the deoxidation process used.

5.2 Manufacturing of tubes

The final reduction(s) of the tube shall be followed by heat treatment to achieve the specified mechanical properties.